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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/500,938	07/08/2004	Gary W. Elko	1053.001B	1487

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MENDELSON AND ASSOCIATES, P.C.  
1500 JOHN F. KENNEDY BLVD., SUTIE 405  
PHILADELPHIA, PA 19102

EXAMINER
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LEE, PING

ART UNIT	PAPER NUMBER
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2615

MAIL DATE	DELIVERY MODE
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07/17/2007

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

# Office Action Summary

Application No.

10/500,938

Applicant(s)

ELKO ET AL.

Examiner

Ping Lee

Art Unit

2615

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 25 April 2007.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-78 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-5, 10-25, 31-35, 40-46, 51-56, 61-71 and 76-78 is/are rejected.
- 7) ☒ Claim(s) 6-9, 26-30, 36-39, 47-50, 57-60 and 72-75 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

## Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

## Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                                | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                       | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

***Claim Rejections - 35 USC § 103***

5. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

6. Claims 3 and 32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Moorer.

Regarding claims 3 and 32, Moorer fails to explicitly show an order of at least three. However, Moorer clearly teaches that the order  $n$  is related to the number of speaker signals to be recorded/reproduced (col. 4, lines 13-18). The example provided in Fig. 1, 3 or 4 in Moorer is five speakers, so order of two is sufficient. If a sound system having more than five speakers, it would have been obvious to one of ordinary skill in the art to modify Moorer's matrix to have the order of at least three in order to accurately represent the sound.

7. Claims 2, 4, 5, 14, 25, 33-35, 44, 54-56 and 63-65 are rejected under 35 U.S.C. 103(a) as being unpatentable over Moorer in view of Elko (US 6,041,127).

Regarding claims 2, 4, 5, 14, 33-35, 44, 54-56 and 63-65, Moorer fails to show that the microphones are mounted on an acoustically rigid sphere. Moorer teaches a general microphone array and the corresponding processor using spherical harmonics derived from the microphone signal without specifying the structure. Elko teaches mounting the microphones on a rigid sphere (col. 1, line 65) to provide harmonic analysis. Thus, it would have been obvious to one of ordinary skill in the art to modify Moorer by mounting the microphones as suggested in Elko in order to improve surround sound recording and playback.

Regarding claim 25, Moorer fails to show calibrating the microphones. Moorer teaches using a general microphone array to derive the speaker signals based on the difference between microphones. Elko suggests calibrating the microphones among each other to improve the accuracy (col. 17, lines 1-25). Thus, it would have been obvious to one of ordinary skill in the art to modify Moorer by calibrating the microphones in the array in order to improve the response.

8. Claims 10, 11, 40, 41, 61 and 62 are rejected under 35 U.S.C. 103(a) as being unpatentable over Moorer in view of Elko as applied to claims 1, 2 and 4 above, and further in view of Staple et al (US005288955A).

Regarding claims 10, 11, 40, 41, 61 and 62, Moorer fails to show the soft sphere. Elko shows the rigid sphere. Staple et al (hereafter Staple) teaches that the microphones are mounted on a soft sphere in order to reduce the vibration and noise. Thus, it would have been obvious to one of ordinary skill in the art to modify Moorer and Elko by mounting the microphones on a soft sphere in order to reduce the noise and vibration.

***Allowable Subject Matter***

9. Claims 6-9, 36-39 57-60, 26-30, 47-50 and 72-75 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

**DETAILED ACTION**

***Claim Rejections - 35 USC § 102***

1. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.
2. Claims 1, 12-24, 31, 42-46, 53, 67, 68 and 71 are rejected under 35 U.S.C. 102(b) as being anticipated by Moorer (US006072878A).

Regarding claims 1, 12, 13, 24, 31, 42-45, Moorer discloses a method for processing audio signals, comprising:

receiving a plurality of audio signals, each audio signal having been generated by a different sensor of a microphone array (for generating mono sources 17 and 19); and decomposing the plurality of audio signals into a plurality of eigenbeam outputs (the end of col. 5), wherein each eigenbeam output corresponds to a different eigenbeam for the microphone array and at least one of the eigenbeams has an order of two or greater.

Regarding claim 15, Moorer shows the step of treating each sensor signal as a direction beam (col. 7, lines 60-65).

Regarding claims 16-18, 46, 51, 52 and 71, the claimed auditory scene reads on the audio signal reproduced by a speaker.

Regarding claims 19-22, 67 and 68, with the digital signal processing (col. 10, lines 17-27), the data is inherently stored for subsequent processing, or it reads on the recording medium.

Regarding claims 23 and 53, Moorer shows the equalizer filter (col. 6, lines 19-42).

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

4. Claims 1, 16, 31, 45, 46, 77, 51 and 78 are rejected under 35 U.S.C. 102(e) as being anticipated by Moorer (US006904152B1) (hereafter Moorer '152).

Regarding claims 1, 16, 31, 45, 46, 77, 51 and 78, Moorer '152 discloses a method for processing audio signals, comprising:

receiving a plurality of audio signals, each audio signal having been generated by a different sensor of a microphone array (for generating mono sources 17 and 19); and  
decomposing the plurality of audio signals into a plurality of eigenbeam outputs (the end of col. 5), wherein each eigenbeam output corresponds to a different eigenbeam for the microphone array and at least one of the eigenbeams has an order of two or greater. The claimed auditory scene reads on the audio signal reproduced by a speaker. The claimed direction reads on the angles ( $\theta$ ,  $\Phi$ ) or coefficient C (col. 16, lines 28-48).

***Response to Arguments***

10. Applicant's arguments filed 4/25/07 have been fully considered but they are not persuasive.

On p. 12, applicant argued that Moorer fails to disclose the step of decomposing a plurality of audio signals into a plurality of eigenbeam outputs because the plurality of audio signals are not audio signal generated by a microphone array. As shown in Fig. 3, there are two monaural sources 17 and 19. As disclosed on col. 3, lines 43-45, each monaural source signal is being picked up by at least one microphone. Therefore, the two monaural sources signals are generated by at least two microphones, which is a microphone array.

On p. 12, applicant states that Moorer discloses the step of decomposing for the embodiment in Figs. 7 and 8, but the eigenbeam in that embodiment does not have an order of two or more. As discloses on col. 4, lines 8-14, the order is related to the number of speaker signal(s). With three speaker signals for the embodiment as illustrated in Figs. 7 and 8, it only requires first order. With five speakers, as illustrated in Fig. 1, 3 or 4, the eigenbeam has an order of two or more. The embodiment as illustrated in Figs. 7 and 8 is merely the modification of the embodiment as shown in Fig. 1, 3 or 4.

On p. 14, applicant argued that Staple fails to show an acoustically soft sphere as specified in claims 10, 40 and 61. Applicant's definition of acoustically soft sphere is not a part of the claim, therefore, it is irrelevant whether the sphere is acoustically hard when compared to the ambient air through which sound arrives at the microphone.

On p. 15, applicant argued that Moorer fails to show spheroidal harmonics. Claims 12, 42 and 63 are rejected based on Moorer in view of Elko. One cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986). In another view, Elko teaches a sphere mounted with a plurality of microphones. The microphones signals from this sphere would be processed by the processor in Moorer. Therefore, Moorer in view of Elko teaches the claimed feature.

On p. 15, applicant argued that Moorer and Elko fails to show the limitation of the arrangement of the sensors in the microphone array satisfying a discrete orthogonality condition as specified in claims 14, 44 and 65. Claims 14, 44 and 65 are rejected by Moorer in view of Elko. Elko shows the microphone arrangement satisfying the claimed limitation.

On p. 16, applicant argued that Moorer fails to show the signal being treated as a directional beam for relative high frequency components for claims 15, 45 and 66. As disclosed on col. 6, lines 19-42, Moorer discloses that the audio signals are being treated as directional beams.

On p. 16, applicant argued that Moorer fails to disclose equalizer filter. Although Moorer fails to use the exact phrase "equalizer filter", the scaler weights for different audio input signal function as the claimed equalizer filter.



***Conclusion***

11. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

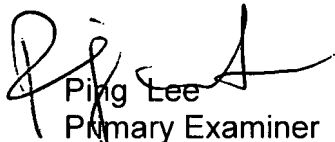
A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the mailing date of this final action.

12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ping Lee whose telephone number is 571-272-7522. The examiner can normally be reached on Monday, Wednesday and Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Vivian C. Chin can be reached on 571-272-7848. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 2615

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

  
Ping Lee  
Primary Examiner  
Art Unit 2615

pwl